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The President of the Senate
The Speaker of the House of Representatives
The Secretary-designate of Transportation

This report is one of a series that summarizes major policy, management, and program issues facing agency heads in the new administration. Through our work in these areas, we have identified many concerns—some relatively new, others long-standing.

This report, on the Department of Transportation, describes our concerns about (1) meeting transportation challenges through strong secretarial leadership, (2) revising the plan to modernize the air traffic control system, (3) improving the Federal Aviation Administration's effectiveness, (4) improving management of transportation infrastructure, and (5) reassessing the Coast Guard's role. We also offer a wide range of observations and suggestions on how the Secretary of Transportation can best address these concerns.

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Meeting Transportation Challenges Through Strong Secretarial Leadership

Transportation is vitally important to the nation's economy, accounting for 15 percent of national employment and 25 percent of the cost of the goods we buy. Currently, the Department must address the aging of much of the nation's transportation infrastructure, rapid growth in demand (with attendant congestion and costly delays), mounting concern for preserving and enhancing safety, and severe fiscal constraints imposed by accumulated federal deficits. Now, more than ever before, there is a need for integrated national transportation planning to ensure sound investments of scarce resources and a safe, effectively organized, and efficiently operating multimodal system. To successfully meet these challenges, the Secretary must take the lead in formulating a coherent national transportation plan.

Enhancing Secretarial Leadership in Policy-Making and Program Oversight

The Department needs to continue efforts to (1) develop and adopt agencywide tools for policy decision-making and (2) devise and use early warning indicators of safety risk and measures of program performance.

The challenges facing the Department call for strong secretarial leadership in policy development, including articulating a

coherent vision of the nation's transportation system and formulating an integrated set of policies and plans to achieve that vision. They also call for building and strengthening the organizational capacity and means through which the Secretary can provide the direction needed to ensure effective implementation of policies and plans. The Secretary also has an important role to play in strengthening departmental management by identifying opportunities to enhance program effectiveness and applying insights and lessons learned from the evaluation of one program to the management of programs in other modes.

Transportation safety is one area where national transportation planning and management improvement should be—and to some extent already have been—carried out at the secretarial level. For example, secretarially directed "white glove" inspections and safety task force reviews were carried out in 1984-85 on the Federal Aviation Administration's (FAA) air carrier safety inspection and security screening programs. They illustrate how such reviews might be used to improve measures of program performance, increase efficiency in staff use, and target limited resources to areas of greatest need and potential payoff. Our examination of the safety task force reports—as well as our

own safety program assessments in the Coast Guard, Federal Highway Administration, and Federal Railroad Administration—suggests that secretarial-level oversight and evaluation could provide both the basis and the impetus for developing

- early warning indicators of safety risks and modal performance problems that could be used to identify and remedy unsafe conditions before accidents occur;[1]
- techniques for targeting inspection resources on the basis of identified high-risk conditions;
- productivity improvement initiatives employing standards/goals of quality, timeliness, and efficiency to promote effective and efficient use of resources and accountability for results; and
- techniques for determining resource needs and assessing progress in meeting program goals.

Consistent with recommendations we made in 1987, the Department has taken

[1]The Congress recently directed that such indicators be developed in the aviation area. They should also be developed for rail, highways, pipelines, and marine transportation.

an important initial step toward institutionalizing the capacity to achieve these kinds of improvements by creating an Office of Safety Program Review, headed by a Deputy Assistant Secretary for Safety. While there have been delays in staffing this office, it has the potential to serve as a good vehicle for exercising secretarial oversight and direction and strengthening safety policies and programs agencywide. A comparable entity, devoted to other crosscutting policy and planning issues, could, in the same way, provide a vehicle for secretarial leadership in integrated national transportation planning.

Reductions in Transportation Data Have Hampered the Department

The Department needs to inventory its data requirements and identify the most cost-effective ways of satisfying them.

The Secretary's ability to formulate sound policies and oversee their implementation depends on the availability of an adequate base of information regarding the condition and operation of the transportation sector and the results of existing policies and programs. Yet, the amount and types of policy analytic data collected by the Department have been reduced in recent years, primarily for reasons of economy and a desire to reduce the reporting burden on the private sector.

Such reductions have resulted in a diminished ability to monitor the performance of the transportation sector and to accurately assess the consequences of policy decisions. For example, we have reported that data limitations relating to aviation hampered the Department in

- recognizing the potential effects on safety of airline deregulation and growth, and
- assessing the impact on consumer fares of airline mergers.

These examples illustrate how timely and accurate information is indispensable to the successful exercise of the Department's roles and responsibilities.

Revising the Plan to Modernize the Air Traffic Control System

Six years into modernization of the air traffic control (ATC) system, FAA is finding that many key projects are taking longer than expected and that additional equipment is needed to meet operational requirements. Furthermore, FAA has experienced delays in installing equipment in the field due to inadequate planning and insufficient staff. Because modernization is vital to maintaining a safe and efficient ATC system, we believe that FAA should revise its modernization plan to

- identify all ATC modernization projects and associated costs;
- establish realistic schedules reflective of past experience; and
- include in project cost and schedules the number of technicians needed to install, operate, and maintain the new equipment.

Plan Does Not Identify All Modernization Projects and Costs

Issued in 1981, the National Airspace System (NAS) Plan called for a technologically complex overhaul of the ATC system, including new surveillance and weather radars, computers, and communications systems. The plan was initially envisioned as a comprehensive identification of all ATC capital improvements needed by FAA until the year 2000. In turn, on the basis of the plan's cost and schedule, legislation

was passed to ensure financing by the Airport and Airway Trust Fund. Specific revenue sources—such as an 8-percent tax on passenger tickets—were instituted.

Today, the NAS Plan no longer represents the full extent of modernization. While some new projects have been incorporated in the plan, many ATC modernization projects have not. These projects include those that enable interdependent systems to function correctly, as well as shorter-term solutions such as upgrading terminal area computers. Furthermore, because no project costs are provided in the NAS Plan, the full cost of ATC modernization cannot be assessed by those responsible for making funding decisions. Consequently, the adequacy of Trust Fund revenues to finance continued modernization cannot readily be determined.

Projected in 1983 at about $12 billion, the NAS Plan is now estimated by FAA to cost about $16 billion. However, because the scope of modernization has gone beyond the NAS Plan, we found that actual ATC modernization could cost about $25 billion by the year 2000.

Schedules Should Reflect Past Experience

More than half of the NAS Plan budget is for 12 projects designated as major systems—projects that will cost more than $150 million each or are critical components of the plan. The 12 major systems have experienced schedule delays ranging from 1 to 5 years. FAA underestimated the complexity of these systems, the time needed to develop software, and the interdependency among systems. Some technologies, thought to be available "off-the-shelf," required further development and testing to meet operational requirements. Project delays have had detrimental effects. First, although FAA expects ultimately to provide better air traffic control with fewer staff because of NAS Plan improvements, the delays are making it difficult for FAA to provide the level of air traffic control needed in the meantime. Second, the NAS Plan is intended to save the airline industry considerable expense by reducing delays and permitting more effective routing, but these benefits are now being pushed further into the future.

Planning Shortfalls and Inadequate Installation Staff Could Delay Modernization

FAA is reaching another critical phase in its modernization effort as an increasing number of NAS Plan systems are being delivered to the field. While the delays described above were encountered during

project development, FAA is now encountering more problems and delays in implementing systems in the field. In some cases, these problems have occurred because FAA did not plan sufficiently to know what had to be done to get facilities ready or did not have enough staff to install the equipment.

FAA plans to address regional staffing problems in implementing NAS systems through a recently awarded contract for technical support services. However, we found that the original request for proposals for such services provided for about 2,000 fewer staff years than FAA's resource estimating system indicated would be necessary. Unless sufficient resources are applied to meet the current NAS Plan schedule, the schedule must be extended and could further increase the cost of ATC modernization.

Improving FAA's Effectiveness, Whether or Not It Is Independent

Several proposals have been advanced that would remove FAA from departmental oversight. The proposals would provide FAA with more autonomy in meeting the challenges of a growing aviation industry and, in the process, exempt the agency from procurement and personnel regulations normally applicable to federal agencies. We examined the reasons offered to support establishing an independent FAA and found that independence would solve neither the agency's procurement nor its personnel problems; nor would independence in itself be sufficient to meet the challenges of rebuilding the air traffic control system and funding FAA operations. Instead, a number of actions will be needed to enhance FAA's effectiveness, regardless of the agency's organizational placement.

Adherence to Procurement Rules Did Not Cause Major Delays

FAA should adopt a more prudent major system acquisition process that minimizes risks by including sufficient time for properly designing and operationally testing costly and complex systems.

We found that following procurement regulations was not the primary cause for FAA's acquisition difficulties in developing NAS Plan systems. Rather, FAA's acquisition problems often stem from the

agency's large-scale procurement inexperience, leading to inadequate planning and underestimates of the time needed to develop complex technology. This has resulted in significantly extending the schedules of many NAS Plan systems.

FAA has only selectively followed the Office of Management and Budget's recommended approach for developing complex systems, and consequently, FAA has not had a sufficient basis to approve systems for production. For example, we found that production of the $1.6 billion microwave landing system was begun before the number and location of sites were validated, benefits demonstrated, and a system prototype tested in an operational environment. We believe that this testing is important because it can alert FAA to the problems a production contractor might have later and thus avoid significant delays in fielding the system.

Fundamental Personnel Problems Remain to Be Resolved

FAA needs reliable staffing estimates to help restore congressional confidence in its judgments about personnel requirements. FAA also needs a national recruitment strategy that uses innovative approaches to attract and retain high-caliber employees.

FAA faces a number of personnel problems that must be addressed regardless of whether it becomes an independent agency. Chief among these problems is that it does not know how many people are or will be needed to carry out its mission. We found that FAA had underestimated its staffing requirements for three critical work forces—air traffic controllers, aviation safety inspectors, and maintenance technicians. Without reliable staffing standards—a critical management tool for determining work force requirements—FAA has not been able to ensure that its budget requests reflect actual needs and, as a result, the Congress has approved funding levels that differ from those requested.

FAA does not have a recruitment policy or a coordinated recruitment program and is finding it difficult to attract and retain high-quality personnel. While FAA has taken some actions on a national level, such as initiating a streamlined controller hiring process, it is critical that the agency develop a national recruitment strategy rather than relying on regions to recruit as needed. FAA could also do more to attract personnel to difficult-to-staff locations if it aggressively pursued the personnel authorities already available to it, such as

- special pay rates for positions where federal employment is not currently competitive with the private sector and
- obtaining authority to hire personnel directly rather than going through the Office of Personnel Management.

Departmental Oversight Has Benefits

The Congress and the administration should consider the advantages of retaining FAA within the Department, such as integrated transportation planning and the benefits of departmental oversight.

Although some perceive the Department as interfering in FAA's operations, departmental oversight has at least two advantages. First, having aviation—the fastest growing mode of transportation—as part of the Department fosters integrated planning and policy-making among transportation modes. Such integration was intended by the Congress 22 years ago when it placed FAA within the Department, and it is still needed today as the nation addresses the urgent matter of integrating aviation, highway, rail, and mass transit infrastructures to support a national transportation system. We believe it is important to consider whether such integration would encounter greater difficulties if aviation were removed from the

Department. A Department without aviation responsibilities might not be as effective in marshaling and coordinating the resources and political support necessary to meet intermodal challenges.

Second, FAA has benefitted from departmental oversight. As discussed earlier, former Secretary Dole appointed a number of "white glove" task forces, two of which focused on FAA's airline inspection and security screening programs. This oversight was instrumental in FAA's taking a more rigorous and comprehensive approach to aviation security and the air carrier inspection program.

Independent or Not, FAA Will Need Stable Funding

Using the Trust Fund to pay for a greater portion of FAA's costs should be considered.

To effectively manage air traffic control system modernization and work force shortages, FAA must have a source of funding adequate to steadily meet long-term costs. The Airport and Airway Trust Fund was established to provide part of FAA's funding needs. The fund is fed mainly through user fees—for example, an 8-percent tax on each passenger's ticket. A portion of the fund is devoted to capital improvements, such as new radars and air

traffic control towers. Within certain limitations set by the Congress, some of the remaining money can be devoted to operations and maintenance activities. The shortfall in operating expenses must be financed from general funds in the U.S. Treasury; that is, FAA has to compete with the myriad of other federal programs that the government funds each year.

While the Trust Fund currently has an unappropriated balance of over $7 billion because of slower-than-expected modernization progress, planned future capital improvement costs dwarf this amount. In addition, future shortfalls will be exacerbated if all operating expenses are paid out by the fund. Indeed, had the Trust Fund receipts been used to finance total FAA outlays for fiscal year 1986, there would have been a deficit of over $1 billion.

A recent President's Aviation Safety Commission report recommended changes in the fund's tax and fee structure, as well as expanded use of the fund to pay a larger share of FAA's costs. Given that the need to fund air traffic control system modernization and work forces will intensify greatly over the next several years, we believe that this funding proposal deserves consideration.

Improving Management of Transportation Infrastructure

Federal, state, and local governments have invested billions of dollars in highways, bridges, mass transit systems, and airports. Despite this huge investment, we reported that considerable portions of the nation's infrastructure are obsolete or deteriorating. Consequently, billions more are needed to repair or replace these assets.

Since both the Highway and Airport and Airway Trust Funds are up for reauthorization in the early 1990s, the timing is right for national attention to be directed at the deterioration and congestion confronting our transportation system. Yet, until needs and their costs are determined accurately and uniformly across modal lines, the Department will be poorly positioned to address transportation infrastructure demands. The Secretary should respond to this challenge by developing an integrated transportation plan that establishes resource priorities.

Needs and Costs Must Be Refined and Prioritized

Transportation must develop an intermodal strategy for responding to infrastructure needs, as well as improve individual needs assessments.

The need to implement an intermodal strategy is not well served by the Department's practice of preparing only separate

needs studies for highways, bridges, mass transit, and airways. These transportation modes share common problems, such as their capital investment needs and limited ability to respond effectively to growing congestion. However, the Department's separate modal approach precludes effective intermodal ranking of needs and development of an integrated transportation strategy.

Further, intermodal planning cannot be achieved simply by combining the various studies, as they differ in material respects. For instance, some studies take into account only those needs eligible for federal funds, and others consider all needs. As a result, combining the studies could paint a misleading picture and would be of little help in setting expenditure priorities and exploring low-cost service delivery alternatives.

In addition, individual needs assessments suffer from weaknesses that limit their usefulness.

- The Department estimates that over 240,000 of the nation's 575,000 bridges are deficient and that about $50 billion will be needed to repair or replace them. We found, however, that this estimate is based

on inaccurate, incomplete, and inconsistently reported state data. Further, we concluded that in order to provide the Congress a more meaningful basis for program policy and funding decisions, the Department needs to distinguish the varying levels of bridge deficiencies and their costs.

- The Department presents highway needs in total—$315 billion through the year 2000 to maintain 1983 highway conditions. But we found that the Department does not make clear that about one-half of this amount represents backlogged highway needs that already exist.

Future Funding Challenges

Funding mechanisms need to be more responsive to transportation needs.

While the cost of meeting current and future transportation infrastructure needs will be substantial, the nation's ability to respond to these needs is constrained by its current practice of spreading limited federal funds among numerous categorical programs on a modal basis. To effectively respond to transportation needs, it is essential that existing and alternative funding mechanisms be evaluated.

Federal funding mechanisms should be aligned with transportation needs. We

found, however, that some of the factors used to apportion federal funds for primary, secondary, and urban highways, such as land area and postal mail route mileage, are not closely related to today's highway needs. To reflect current highway use, these formulas should consider factors such as lane miles of highway, vehicle miles of travel, and motor fuel consumption.

The Congress and the administration should consider funding options to determine how transportation needs can best be met, given resource constraints. One option would be to redefine and streamline federal responsibilities to those considered to be of national and interregional significance, while restructuring the remaining federal programs to give state and local governments more flexibility in using transportation funds. Another option would be to design federal funding mechanisms to encourage increased transportation-user fees at the state and local level, including toll roads and impact fees on developers.

Technological Innovations Could Help

The Department needs to promote technological innovations to extend the life of the existing transportation network and ease the strain of congestion.

Technological innovations show promise for responding to the nation's transportation infrastructure needs. However, an integrated strategic research agenda is needed to close modal research gaps and explore new technological opportunities.

A small improvement in highway performance and durability through innovation could yield savings of billions of dollars. This savings opportunity is being approached through a strategic highway program aimed at improving pavement and bridge materials and components through a program of high-payoff research. Because there is the potential for similar payoffs in other areas, long-term, strategic research programs should be developed for each transportation mode, as well as across modal lines.

There is inconsistent emphasis given to new technological developments across modal lines. For instance, FAA has made a research commitment to commercial use of tilt-rotor aircraft. This aircraft can take

off and land vertically—like a helicopter—thus offering possibilities for reducing airport congestion. Another potential alternative for alleviating both airport and highway congestion is magnetic levitation—a new rail technology that goes beyond steel wheel on rail. This is a high-speed intercity rail system capable of speeds in excess of 250 miles an hour. It is under development by Japan and West Germany, but the Federal Railroad Administration's support is limited to funding local feasibility studies.

Certain barriers forestall research and its application, even for less controversial technologies. For instance, we reported that research and development of highway pavement technologies can improve U.S. highways by pointing to opportunities for cost savings and more efficient performance. However, as we found, pavement research and application processes are fragmented, and technology evaluations need improvement.

Reassessing the Coast Guard's Role

The Coast Guard faces expanding responsibilities that threaten to outpace its available resources. It needs to reevaluate the appropriateness of its roles and bring its responsibilities into better alignment with its resources.

Need to Reevaluate Roles and Available Resources

The Coast Guard needs a comprehensive evaluation of its changing roles and responsibilities.

Traditionally, the Coast Guard's primary roles involved water-related safety, including boating safety, search and rescue, and aids to navigation. However, in recent years, the Coast Guard has become increasingly involved in interdicting drug shipments and defense-related activities. To accommodate these new responsibilities, it has significantly shifted its resources. For example, as measured by the share of operating expenses between 1980 and 1987,

- safety missions declined from 60 to 51 percent,
- marine environmental protection declined from almost 13 percent to 7 percent, and
- drug enforcement increased from 7 to 22 percent.

Cutbacks in safety and other areas, announced in early 1988 in response to budget constraints, led to protests from affected parties and legislation directing that service levels be preserved or restored. Aggravating the situation was the Coast Guard's eagerness to take on a new mission—sending a number of cutters to the Persian Gulf—even as it was cutting back random drug patrols and search and rescue operations.

Coast Guard personnel told us that key programs are understaffed, resulting in long work-weeks, and training is inadequate. Further, the capital budget is too small to provide all needed maintenance, parts, and equipment; to replace aging vessels; and to maintain and replace shore facilities.

We believe that the Coast Guard should reconsider the roles it strives to fulfill and the level of performance expected. Among the options that might be considered are

- ranking its major activities and identifying ways to better target safety resources;
- seeking out additional opportunities to delegate or privatize activities and developing sound cost-effectiveness justifications for any such proposals;

- exploring options for greater use of reservists and the Coast Guard auxiliary;
- increasing its emphasis on research and development on labor-saving technologies, such as aids to navigation; and
- identifying opportunities for increased user financing.

Having performed this reevaluation, the Coast Guard would be well positioned to offer options to the Congress on those roles and levels of activity that prudent management and budgetary policy can realistically support.

Better Management Information Is Needed to Support This Reevaluation

The Coast Guard needs current staffing standards and better program effectiveness measures.

A comprehensive reevaluation can yield meaningful results only if it is supported by adequate information. However, we and the Coast Guard itself have noted serious weaknesses in management information. For example, staffing standards help define total resource needs because they determine the number of people needed to effectively perform a particular task. The Coast Guard has not made an overall determination of its staffing needs since 1980.

Program effectiveness measures are also important for making resource allocation decisions, including decisions to curtail or eliminate certain activities and facilities. To improve the overall management of the Department's safety programs and resources, we recommended in 1987 that the Secretary of Transportation develop operational measures of effectiveness for activities like the Coast Guard's recreational boating safety program; two internal Coast Guard studies reached a similar conclusion. However, we recently reported that the Department is still not attempting to measure the program's effectiveness. After reviewing the Coast Guard's rationale for selected facility cutbacks and closings in 1988, we reported a lack of convincing support—including significant weaknesses in savings estimates—and a lack of analysis concerning the effectiveness of facilities slated for closure.

Related GAO Products

Secretarial Leadership	Department of Transportation: Enhancing Policy and Program Effectiveness Through Improved Management (GAO/RCED-87-3, Apr. 13, 1987, and Supplement, GAO/RCED-87-3S, July 24, 1987).
Air Traffic Control Modernization	FAA Staffing: Recruitment, Hiring, and Initial Training of Safety-Related Personnel (GAO/RCED-88-189, Sept. 2, 1988). Microwave Landing Systems: Additional Systems Should Not Be Procured Unless Benefits Proven (GAO/RCED-88-118, May 16, 1988). Testimony on the National Airspace System Plan and Other Federal Aviation Administration Appropriations Issues (GAO/T-RCED-88-35, Apr. 12, 1988). Testimony on the Federal Aviation Administration's Advanced Automation System (GAO/T-IMTEC-88-3, Apr. 12, 1988).
FAA Effectiveness	Testimony on Issues Related to an Independent Federal Aviation Administration (GAO/T-RCED-88-45, June 2, 1988).
Transportation Infrastructure	Highways: How State Agencies Adopt New Pavement Technologies (GAO/PEMD-88-19, Aug. 12, 1988).

Bridge Condition Assessment: Inaccurate Data May Cause Inequities in the Apportionment of Federal-Aid Funds (GAO RCED-88-75, May 20, 1988).

Highway Needs: An Evaluation of DOT's Process for Assessing the Nation's Highway Needs (GAO/RCED-87-136, Aug. 7, 1987).

Highway Funding: Federal Distribution Formulas Should Be Changed (GAO RCED-86-114, Mar. 31, 1986).

Coast Guard's Changing Role

Coast Guard: Decision to Phase Out Curtis Bay Yard Is Inadequately Supported (GAO/RCED-89-29, Oct. 7, 1988).

Testimony on Coast Guard Resources, Missions, and Priorities (GAO/T-RCED-88-28, Mar. 22, 1988).

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